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In consequence of observations from Mr. Bond, Professor Peirce remarked that, as long as Saturn has a ring, the natural hypothesis of its solidity cannot be set aside from any argument of mere improbability, without the suggestion of some more probable hypothesis. The argument from uncomputed perturbation is especially vague and uncertain, and cannot be admitted into science, which is knowledge, and not ignorance. The hypothesis of a fluid ring was at the time of Mr. Bond's memoir more improbable than that of the subdivision into solids. For the mutual resistance of the particles of the ring to internal currents would sooner or later reduce the ring to one uniform velocity of revolution about Saturn, which would at once be its complete destruction, just as certainly as if it were solid. The fluid constitution is therefore quite impossible without some kind of action to counteract this tendency to break to pieces; and no such action was ever suggested or known to science until Mr. Peirce's own investigations upon the tidal action of the satellites.

Professor Peirce offered some remarks on Captain Rodman's work and experiments upon the construction of heavy ordnance. He regarded this work as of great scientific and practical value, and the observations as entitled to the highest confidence, on account of the accuracy and fidelity with which they are made. He found no corrections in the reductions of the observations which materially impair their value for the use for which they were made.

Five hundred and fifth meeting.

March 10, 1862. — ADJOURNED STATUTE MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary read letters from Sir William Fairbairn and from Captain Duperrey, in acknowledgment of the official notification that they had been elected Foreign Honorary Members of the Academy. Also from Alvan Clark, Esq., of Cambridge, in acknowledgment of his election as a Fellow of the Academy.

Rev. James Mills Peirce, of Cambridge, was elected a Fellow, in Class I. Section 1.

Professor Agassiz made a communication upon the copulation of the Selachian Fishes.

Prof. Treadwell read an elaborate paper on the force of fired gunpowder, the strength of guns, and the velocity of projectiles; being a continuation of the examination made by him, at the January meeting, of Captain Rodman's instruments and experiments.

The examination of the subject this evening was made in special reference to the partial and conditional defence made by Professor Peirce, at the February meeting, of the accuracy of the instruments and experiments of Captain Rodman. Professor Treadwell explained the action of gunpowder, by referring it to the measure of the force of a column of liquid by which a jet is projected through an aperture in the side of a vessel. He then exhibited diagrams showing the force of powder in a cannon, during its development and action upon the ball; and, taking a particular case given in Captain Rodman's book, page 197, he showed that the measures of the force, as there given, were impossible, both in character and amount, as the ordinates representing the forces through the caliber are actually greater near the muzzle than nearer the breech. He then deduced, from the mean of all the ordinates, that the force produced by 12.67 pounds of powder must, if true, in this case have given a velocity of 2,966 feet a second to a ball of 186.3 pounds weight; when it is shown by the experiments of Captain Mordecai that a charge of 12 pounds will produce only a velocity of 2,046 feet a second in a 24-pound shot. He showed, moreover, that in this very experiment of Captain Rodman, where, if the instrumental measures of the force had been correct, the resulting velocity must have been 2,966 feet, the velocity actually produced was, as measured by Captain Rodman himself, only 920 feet a second. He then proceeded to demonstrate from all the preceding examination, that the actual mean pressure of the powder was but 3,390 pounds per square inch; whereas it is indicated by Captain Rodman's instrument at 35,213 pounds per inch; and hence that the instrumental measure is 10.38 times greater than the true measure.